agent **83** to form a reacted epoxy-amine adduct. The heat generated during this exothermic reaction causes the expansion of gas within the expand cells, therein creating pockets within the reacted epoxy-amine adduct (i.e. foam **78**). One preferred type of expand cell utilized in the foaming process is Terecore, available from Henkel.

In another preferred embodiment, an epoxy amine adduct is formed as above and subsequently expanded using gas evolution technology. In gas evolution technology, a secondary reaction product formed in addition to the epoxy-amine adduct is used to expand the epoxy-amine adduct expands to forms the foamed structure **78**.

In yet another preferred embodiment, polyurethane polymers are formed by the reaction of polyol resins (the precursor resin **79**) and blocked or unblocked isocyanate-based polymers (the crosslinking agent **83**). This polyurethane polymer is foamed by introducing nitrogen during the reaction process as a blowing agent.

FIG. **8** illustrates a process flow chart for forming the foam reinforced D-pillars **18** as shown above in FIGS. **2**–**5** according to a present invention.

In Step **100**, a pair of baffles **40** is inserted within outer and inner portions **25**, **27** each of the pairs of D-pillars **18**. Each baffle **40** is error proofed to assure presence and proper location within its respective portion **25**,**27**. The outer portion **25** is then coupled to the inner portion **27** to form the D-pillar **18** containing the baffle **40**.

Next, in step **110**, the vehicle body, including the various pillars **12**, **14**, **16**, **18** and rails **20**, **22**, **24**, **26** described above, are assembled to form the support structure **10**.

In step **120**, the support structure **10** is then introduced through an electrocoat bath. The electrocoat bath introduces a layer of electrocoat **43** to all exposed surfaces of the structure **10** at a thickness that is dependent upon the electrical charge applied to the assembly in a method well known in the art. The composition of the electrocoat **43** is preferably an amine-capped epoxy that is reacted with a blocked isocyanate material well known to those of skill in the art.

In step **130**, the coated structure **10** is introduced to a baking oven, wherein the electrocoat **43** is cured to the metal parts comprising the structure **10**. At the same time, the baffles **40** expand to seal to the inner walls **41** between the outer portion **25** and inner portion **27**, therein forming the upper and lower cavities **28**, **30**.

Next, in step **140**, a series of plugs, grommets and tape are installed into or over the remaining cavity holes **50** on the sealer deck **52**. In addition, the septums **32**A, **34**A covering the fill holes **32**, **34** are introduced.

The entire structure **10** is then introduced to a paint booth in step **150**, wherein the various body panels are painted and otherwise processed in a method well known in the art.

After paint processing, in Step **160**, the structure **10** is introduced to a structural foam injection cell or area that contains the robotic viscous fluid application device **70**. Next, in Step **165**, the vision system **84** locates the respective fill holes **32**, **34** and sends a signal to the line controller **99**. The line controller **99** then interprets the electrical signal and sends a second electrical signal to the controller **74** of the robotic viscous fluid application device **70** as a function of the fill hole locations **32**, **34**.

In Step **170**, the robotic viscous fluid application device **70** interprets the processed signal sent from the controller **74**, moves the robotic arm **72** to the location of the respective fill hole **32**, **34**, and inserts the nozzle portion **80** within the respective fill hole **32**, **34** such that the septum **32**A, **34**A is sealingly engaged to the nozzle portion **80** and such that the tip **82** is contained within the respective cavity **28**, **30**. The robotic controller **74** then sends a signal to the dispensing controller **97** that the robotic arm **72** is properly positioned. The dispensing controller **97** sends a signal to the shot meters **85**, **95** to release the precursor resin **79** and crosslinking agent **83** to the static mixer **76**. The static mixer **76** thoroughly mixes the resin **79** and crosslinking agent **83** to form a reacted viscous material that begins to foam. The foam **78** is subsequently injected through the tip portion **82** of the nozzle **80** and into the respective fill hole **32**, **34**. The foam **78** is allowed to further expand to within the respective cavity **28**, **30**. The expansion rate and flow rate of the foam **78** is predetermined to ensure complete filling of the respective cavity **28**,**30** at a desired density.

Finally, in Step **180**, the structure **10** is removed from the foam injection cell **60**. The structure **10** may then be further processed to introduce various components and features to the respective pillars **12**,**14**, **16**,**18** and rails **20**, **22**, **24**, **26** to form the vehicle **9** in a method well known in the art and not a subject of the present invention.

The present invention thus provides a new process for robotically applying high volumes of structural foam for construction of support structures. The process uniquely integrates systems communications, non-contact vehicle insertion point locating, and applications controls that accurately dispenses a two-component viscous material at a high volume and high flow rate. The dispensing control system parameter programming is open architecture allowing robot controls to access a database via device-net communications to reduce processing time.

While the invention has been described in terms of preferred embodiments, it will be understood, of course, that the invention is not limited thereto since modifications may be made by those skilled in the art, particularly in light of the foregoing teachings. For example, while the support structure **10** above contemplated the use of the robotic viscous fluid application device **70** on a D-pillar **18**, it is specifically contemplated that any hollow support structure other than a D-pillar **18** may be injected with a support foam using the same process. Further, while the use of a two-component epoxy foam **78** is preferred, other foaming chemistries or viscous fluids may be introduced to a cavity using the device **70**.

What is claimed is:

1. A method for reinforcing hollow support structures comprising:

providing the hollow support structure having an inner wall and a fill hole;

introducing a pair of baffles within the hollow support structure;

applying an electrocoat coating to said hollow support structure and said pair of baffles;

heating said hollow support structure within an oven to expand said pair of baffles to seal to said inner wall of said hollow support structure, therein forming a cavity defined between each of said pair of baffles and within said inner wall;

forming a two-component viscous fluid within a robotic viscous fluid application device;

injecting a high volume of said two-component viscous fluid from said robotic viscous fluid application device through said fill hole at a high fill rate, wherein said two-component viscous fluid reacts to form a reacted viscous fluid and wherein said reacted viscous fluid expands to form a foam that substantially fills said cavity.